

# HMT-West/CalWater 2011: IOP6 Summary

- Operations director: Dave Kingsmill
- Duration
  - Start: 06 UTC 1 March 2011
  - End: 00 UTC 4 March 2011
- Activities at Lincoln (LHM) field site
  - Skywater Doppler radar operated from ~05 UTC 2 March to ~00 UTC 4 March. No gaps in data collection were experienced.
  - A total of 12 GPS balloon soundings were released at the following times:
    - 1 March (06, 12, 18 UTC), 2 March (00, 04, 08, 12, 16, 20 UTC), 3 March (00, 06, 12 UTC).
- NWS rawinsonde activities
  - No NWS supplementals requested

# HMT-West/CalWater 2011: IOP6 Summary

- Autonomous instrument operation problems
  - Alta (ATA): Tipping bucket precipitation gauge was malfunctioning between 06 UTC 1 March and 00 UTC 3 March.
  - Greek Store (GKS): ETI precipitation gauge malfunctioned throughout the IOP
- G-1 aircraft operations
  - Flights 21 and 22 (2 March) and Flight 23 (3 March)
- Water collection for isotopic analysis
  - Cazadero: 00 UTC 2 March to 00 UTC 4 March
  - Lincoln, Shasta and Sugar Pine: 06 UTC 2 March to 06 UTC 4 March

# HMT-West/CalWater 2011: IOP6 Summary

- Overview

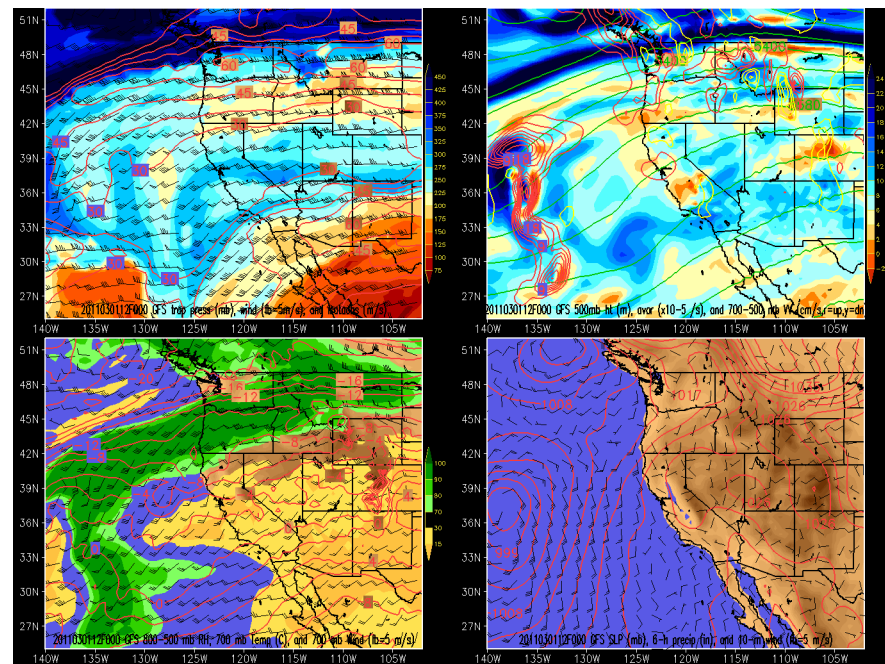
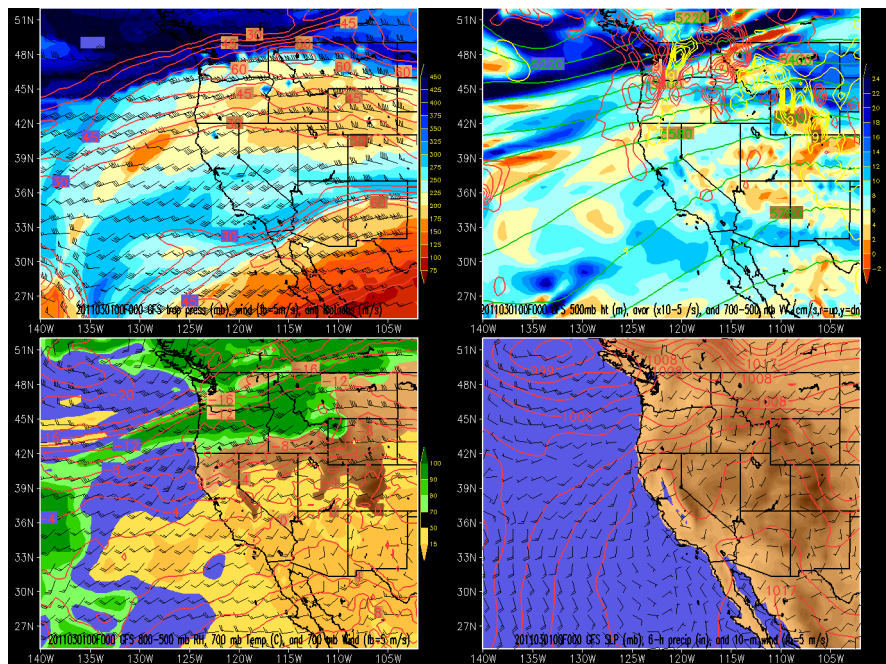
This 66 hour IOP was associated with a marginal atmospheric river (AR) that had a subtropical connection. The event ushered in a considerably warmer airmass compared to land-falling storms of the preceding few weeks. A single episode of widespread precipitation was observed during the night of 1 March into the morning of 2 March. A relatively strong barrier jet was evident along the Sierra. There was a distinct frontal passage during the day on 2 March, but it was not accompanied by a narrow-cold-frontal rainband. After the frontal passage, scattered showers persisted along the Sierra during the night of 2 March into the morning of 3 March. Snow levels started out around 5 kft then rose to ~8 kft in the strong warm advection present ahead of the cold front. After frontal passage, snow levels gradually descended back down to ~5 kft. Precipitation accumulations for the IOP were 1" to 3" in the Sierra, 1" to 2" inches along the coastal mountains and less than 0.25" in the Central Valley.

The images in the following slides provide additional context for the IOP

00 UTC 1 March

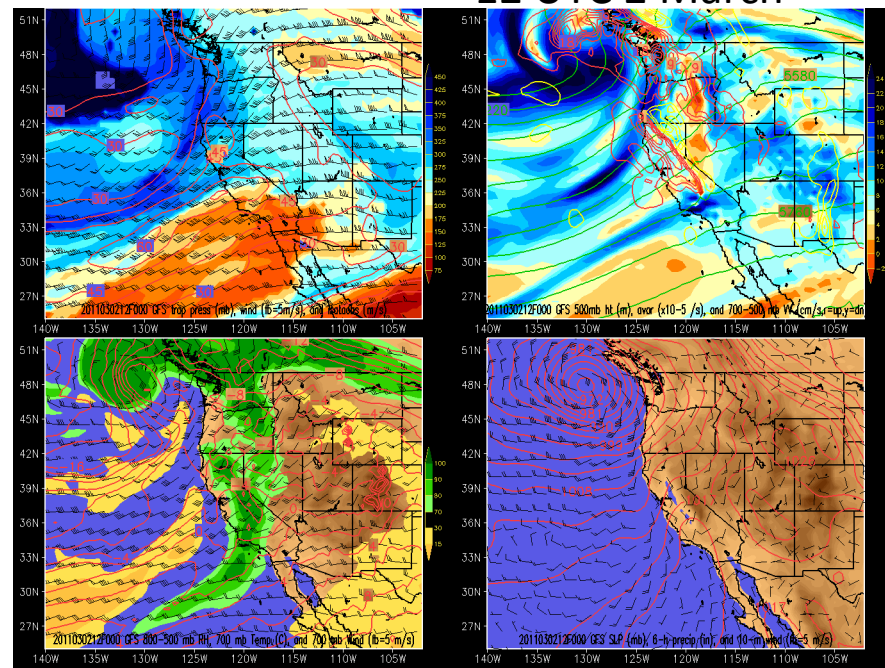
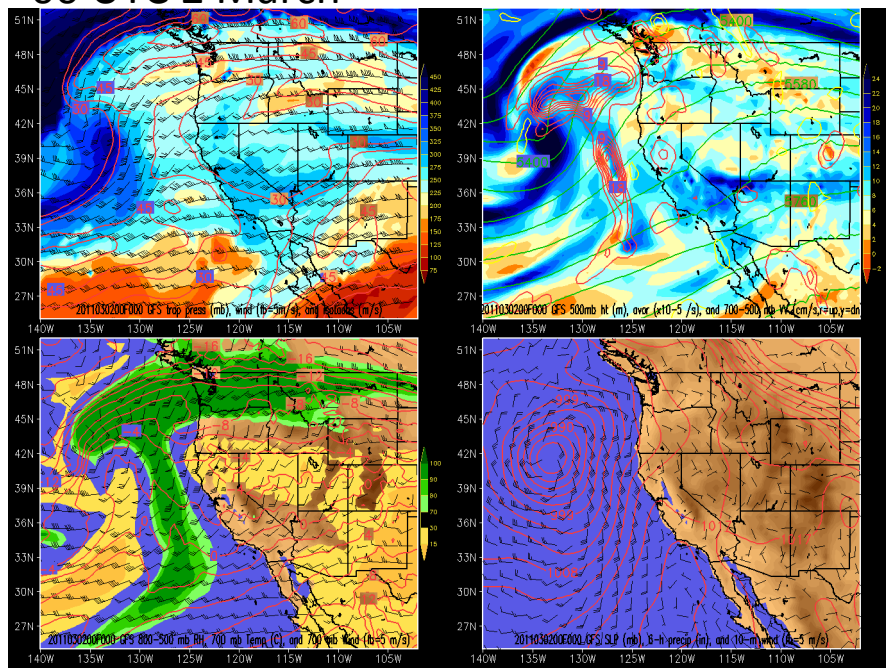
## Synoptic Evolution

12 UTC 1 March



00 UTC 2 March

12 UTC 2 March

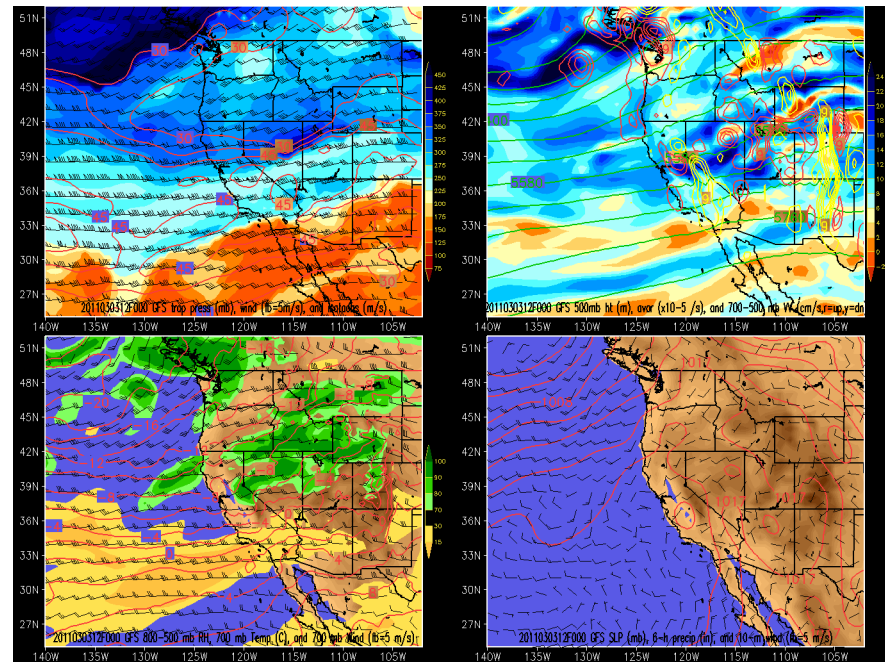
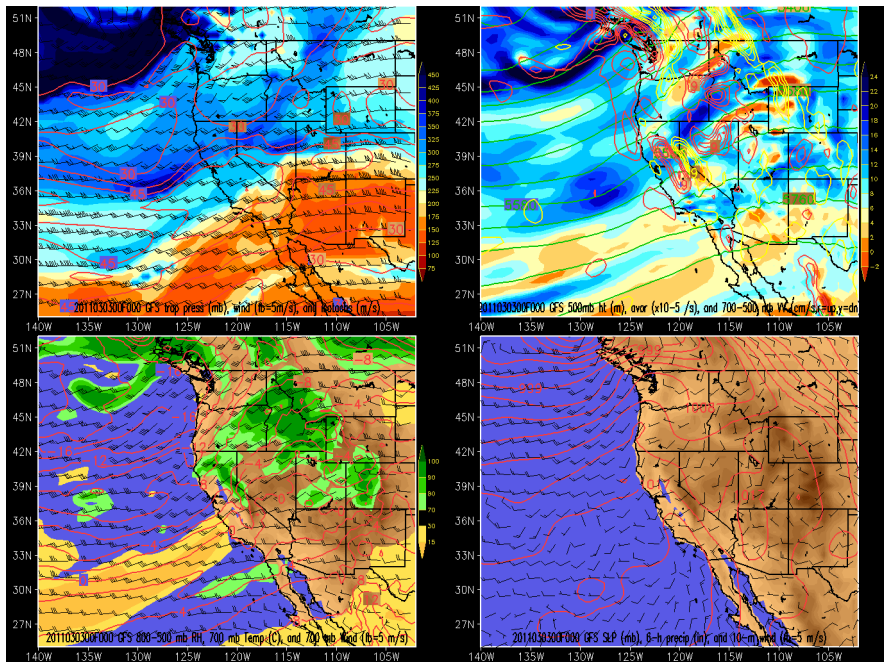




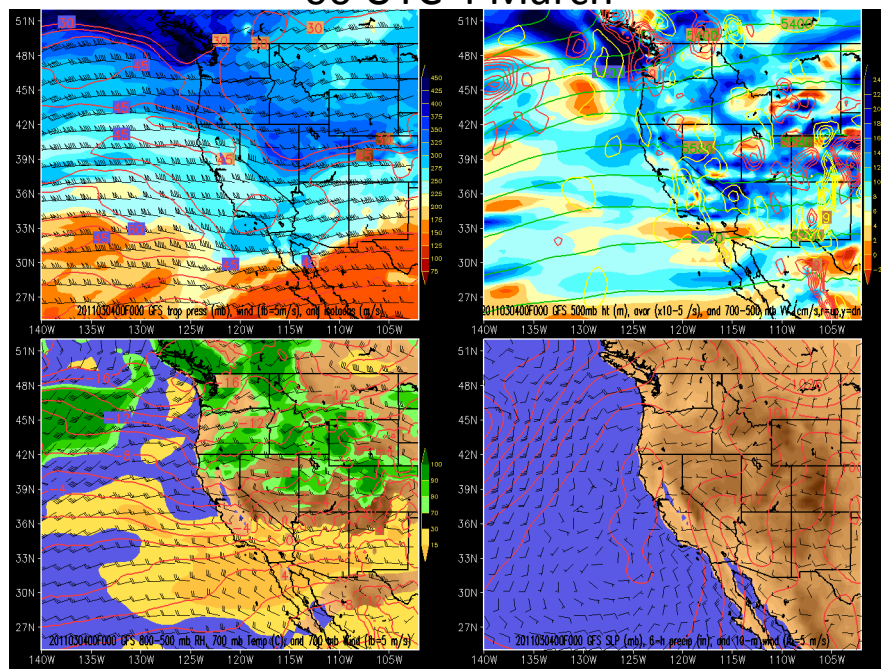
00 UTC 3 March

# Synoptic Evolution

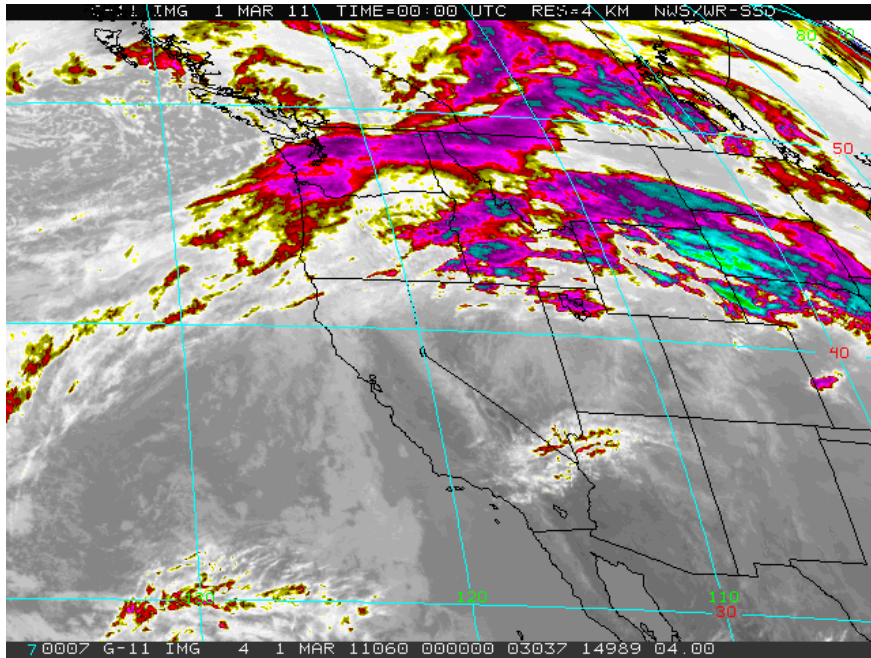
12 UTC 3 March



00 UTC 4 March

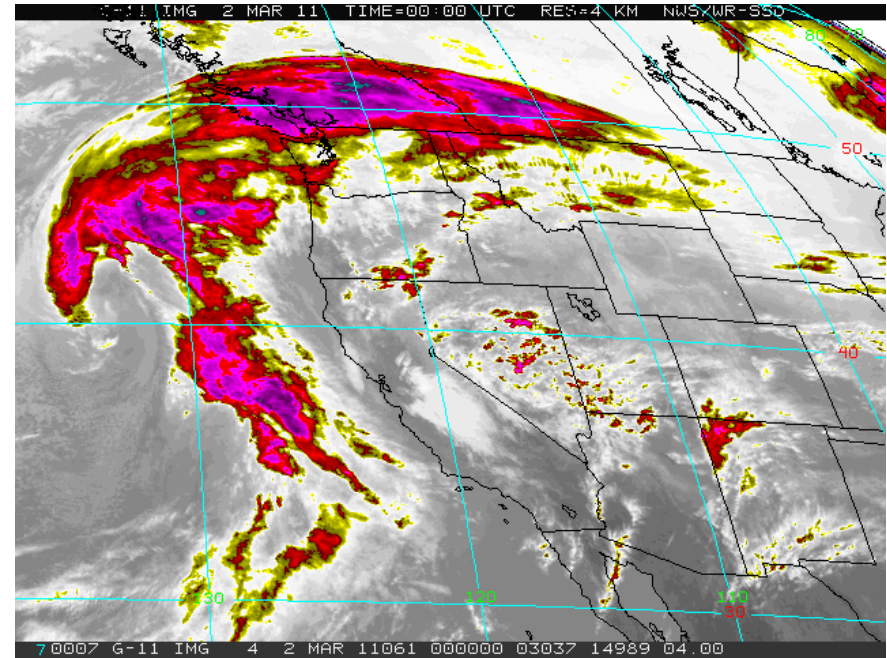


00 UTC 1 March

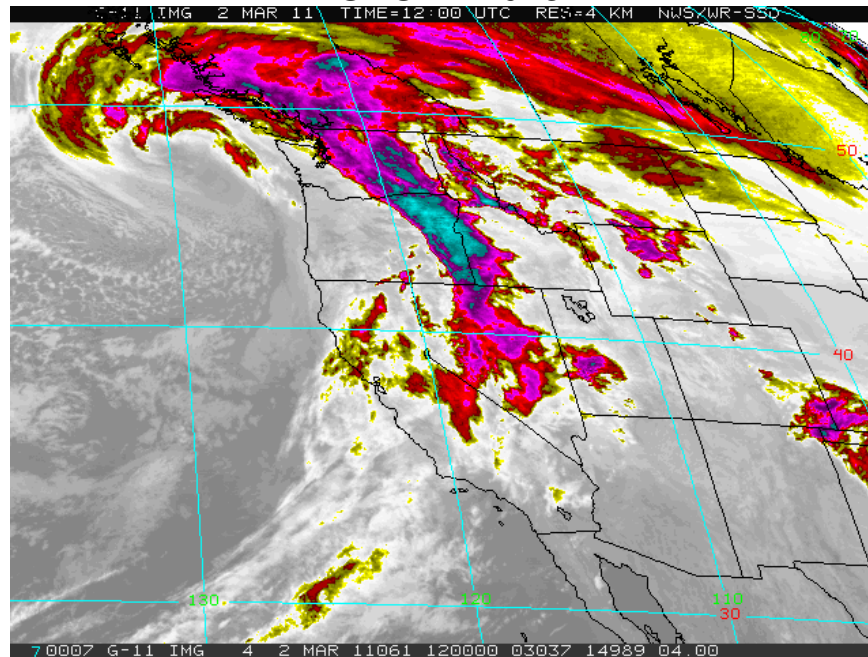


IR Satellite Evolution

00 UTC 2 March

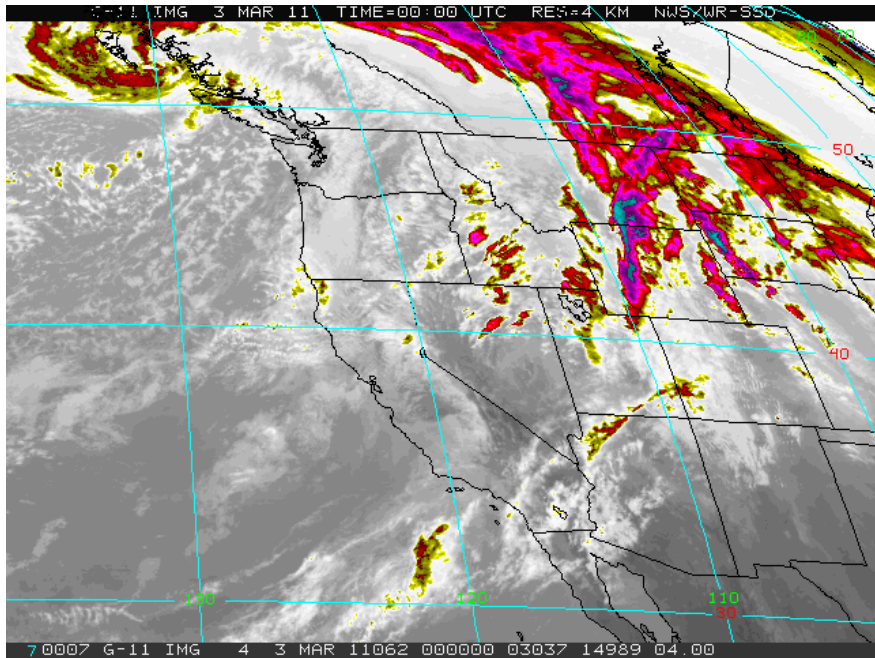


12 UTC 2 March



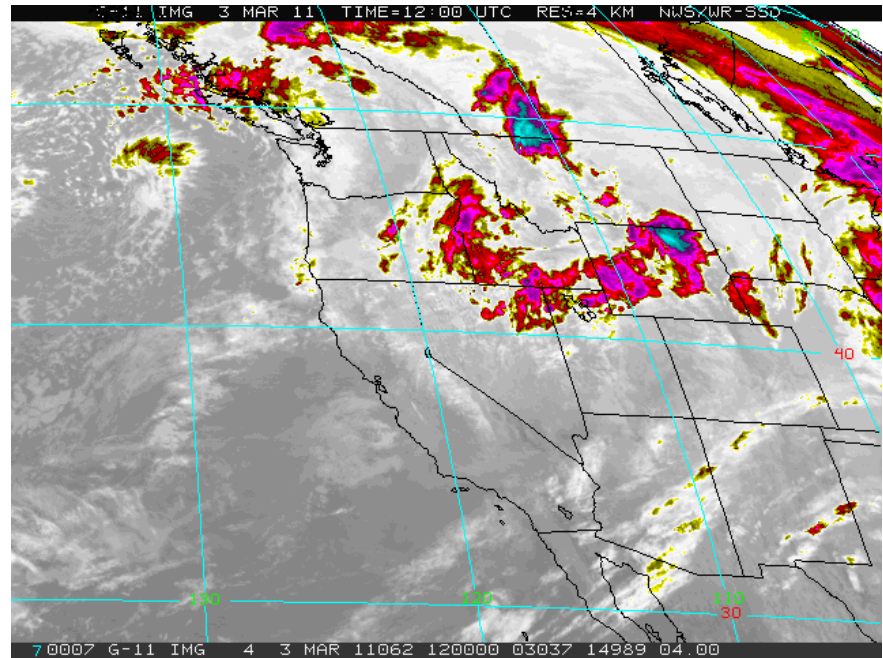


00 UTC 3 March

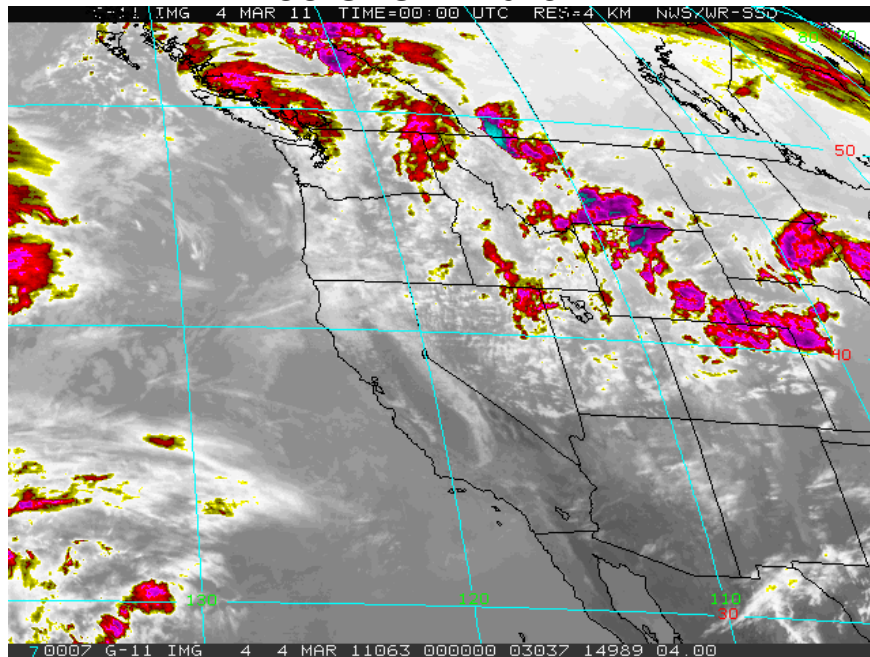


IR Satellite Evolution

12 UTC 3 March

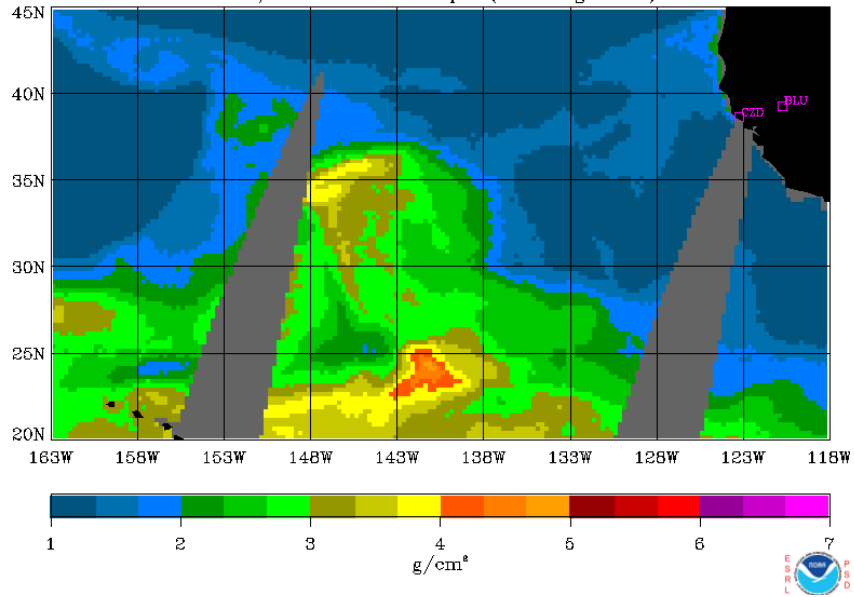


00 UTC 4 March

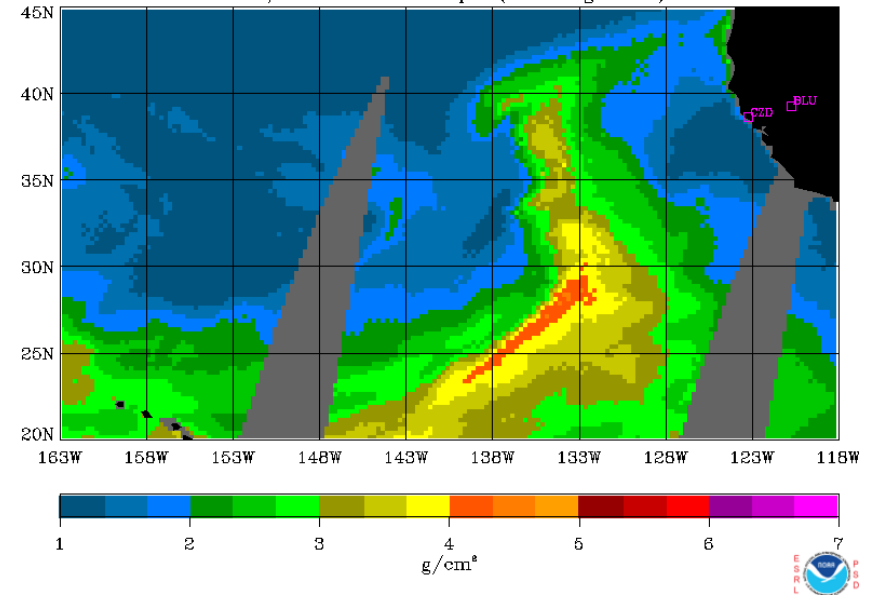


# SSM/I Satellite I WV Evolution

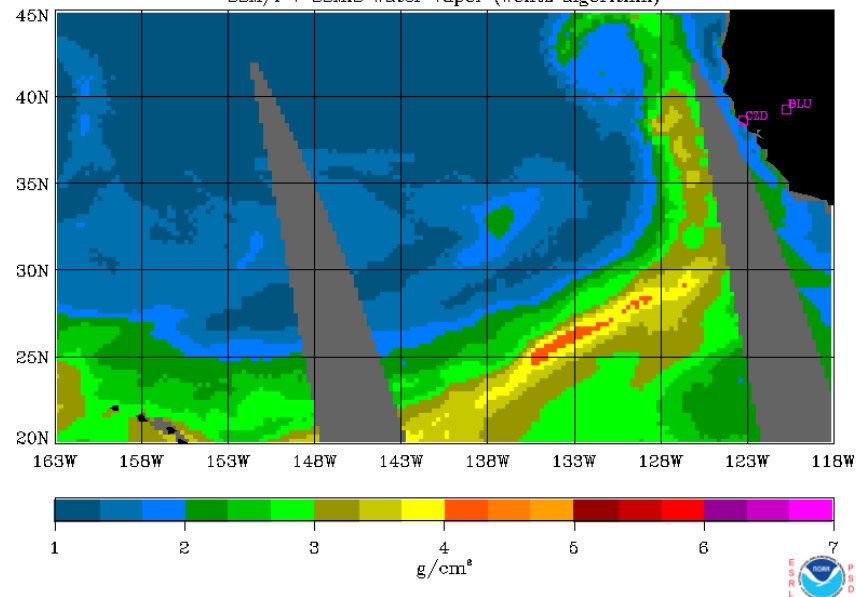
March 01, 2011 0100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



March 02, 2011 0100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



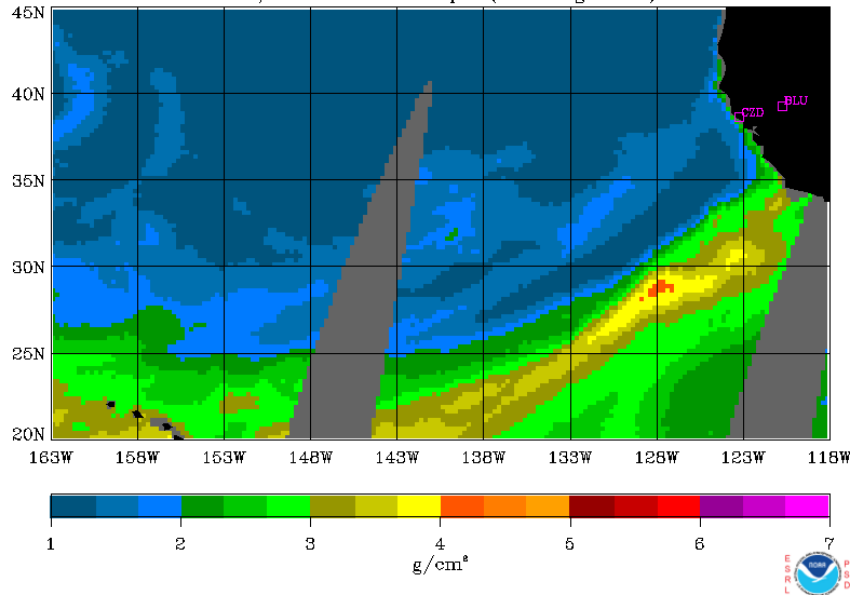
March 02, 2011 1300 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



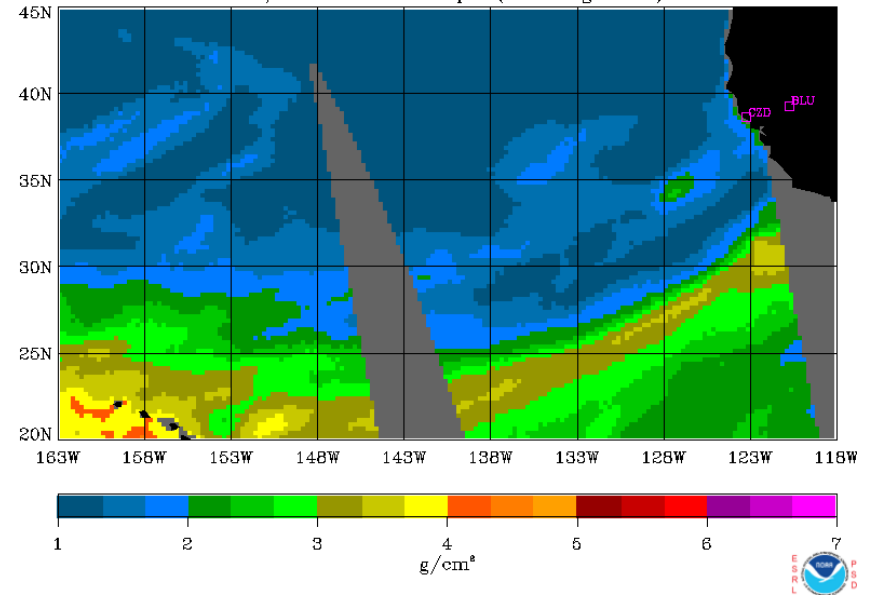


# SSM/I Satellite I WV Evolution

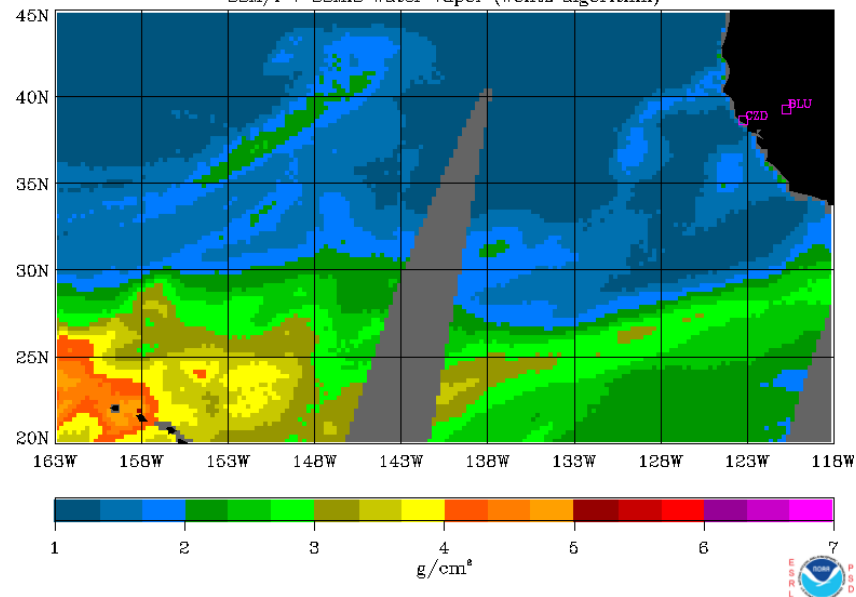
March 03, 2011 0100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



March 03, 2011 1300 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)

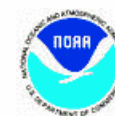


March 04, 2011 0100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)

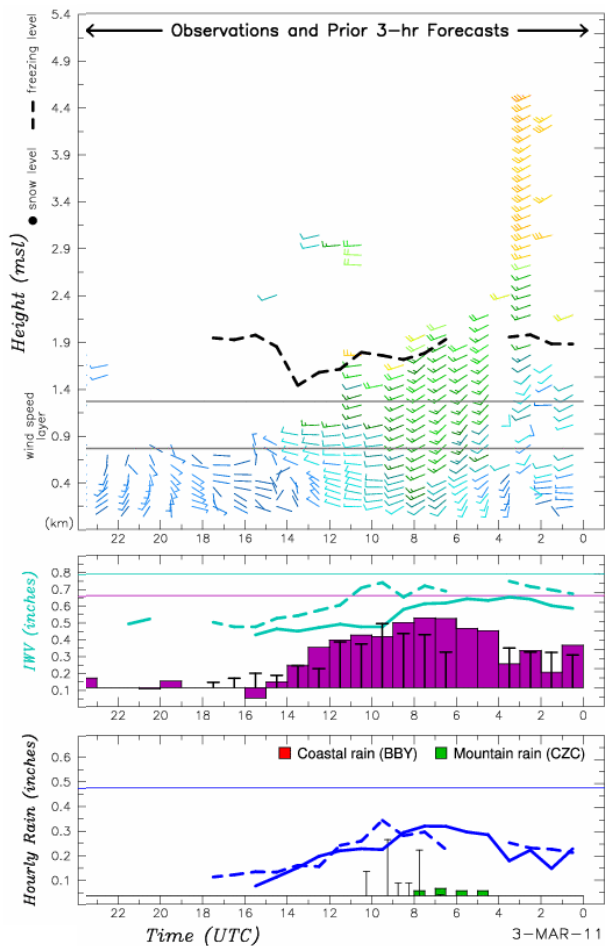


# Winds and Water Vapor Flux @ Bodega Bay

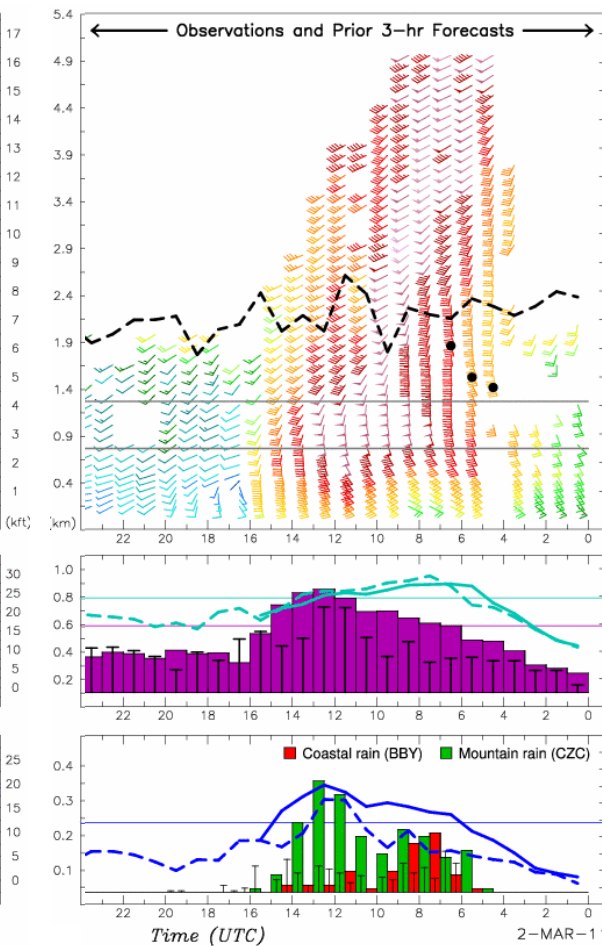
ESRL Physical Sciences Division  
Coastal Atmospheric River Monitoring and Early Warning System  
*Model forecast provided by the ESRL Global Systems Division*



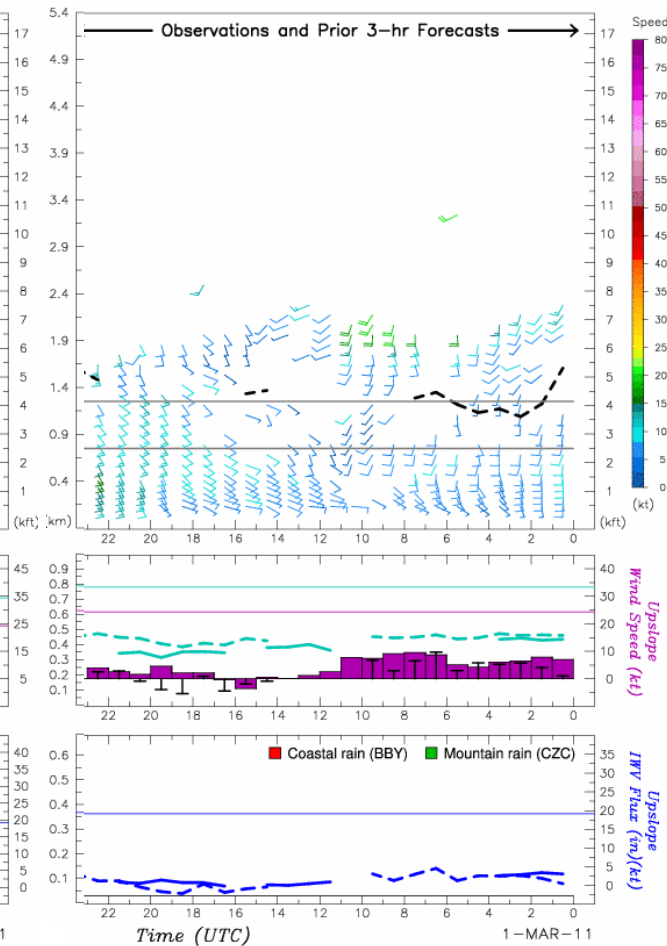
3 March



2 March



1 March



Bodega Bay, CA (BBY)  
38.32 N, 123.07 W, 12 m  
Cazadero, CA (CZC)  
38.61 N, 123.22 W, 475 m

Upslope Wind Direction = 230°

# Winds and Water Vapor Flux @ Sloughhouse

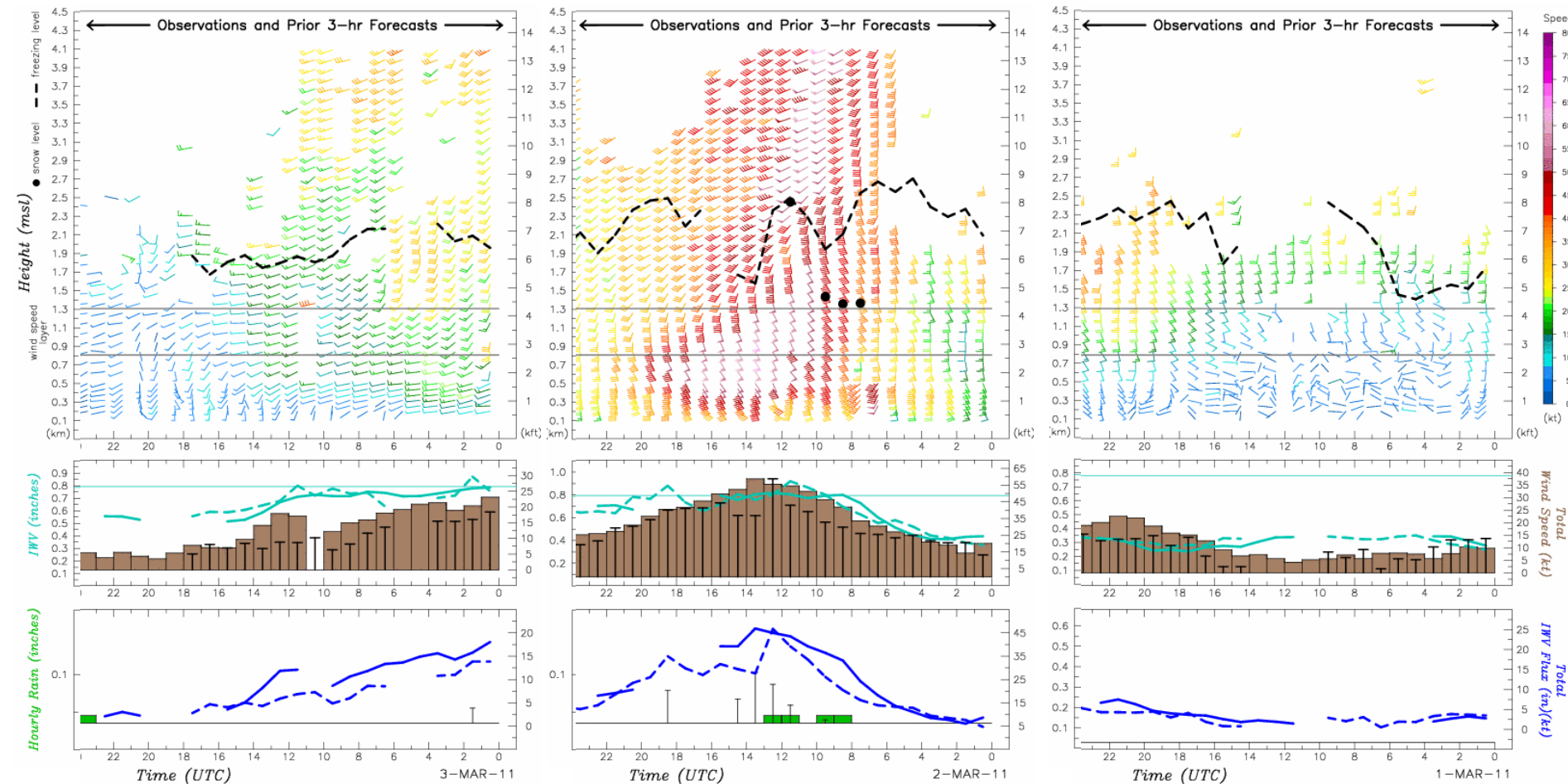
ESRL Physical Sciences Division  
Coastal Atmospheric River Monitoring and Early Warning System  
*Model forecast provided by the ESRL Global Systems Division*



3 March

2 March

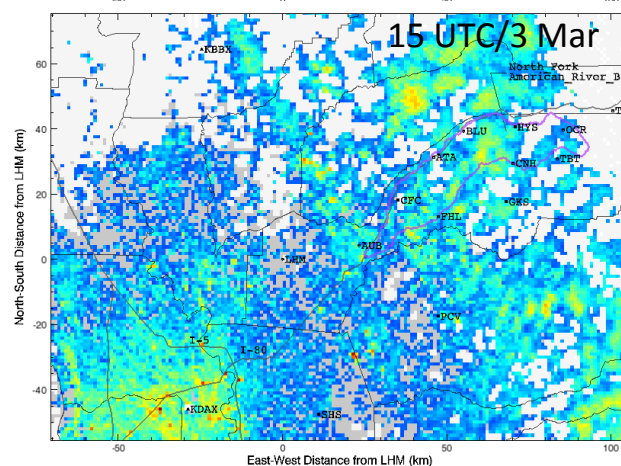
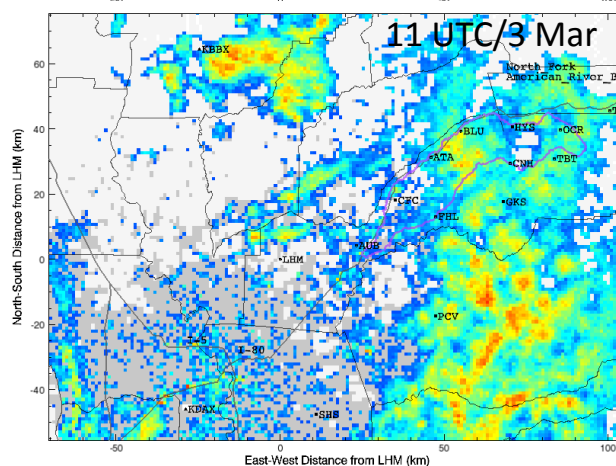
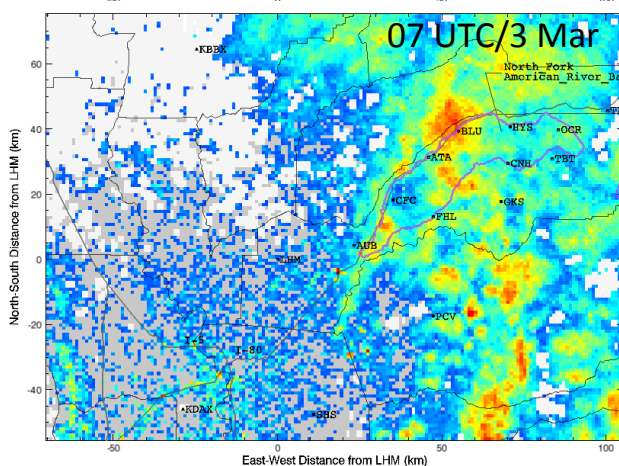
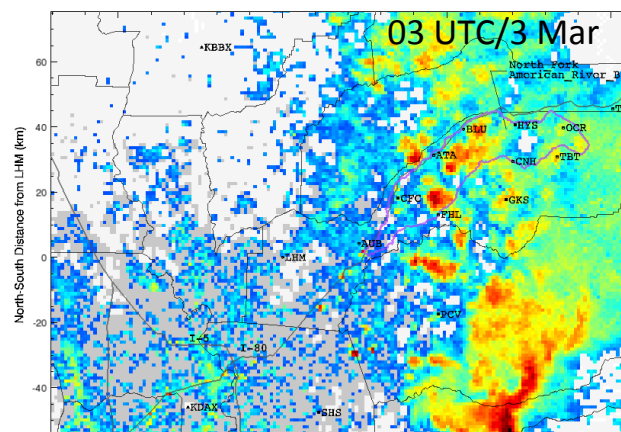
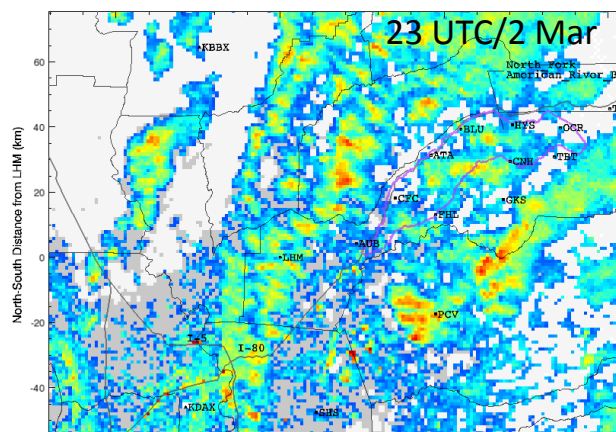
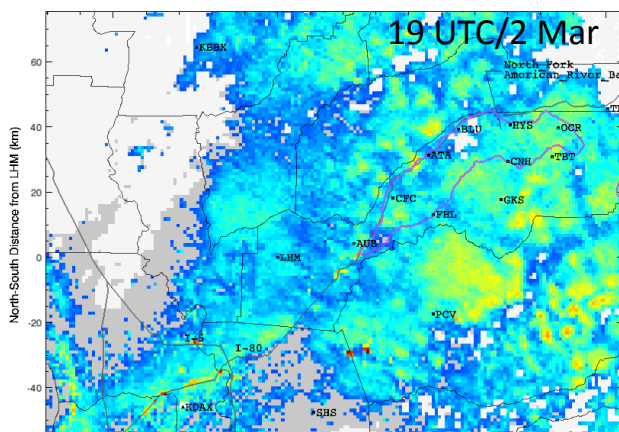
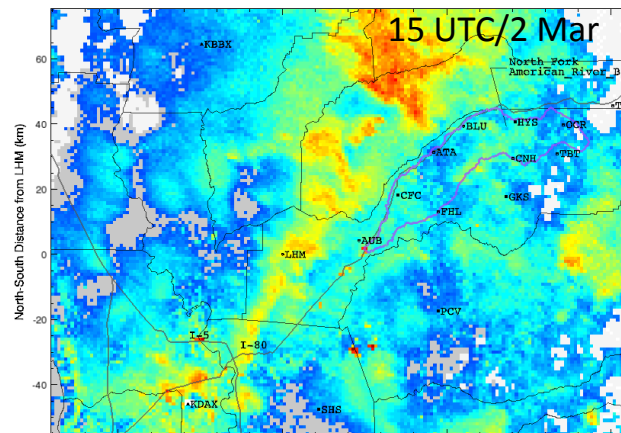
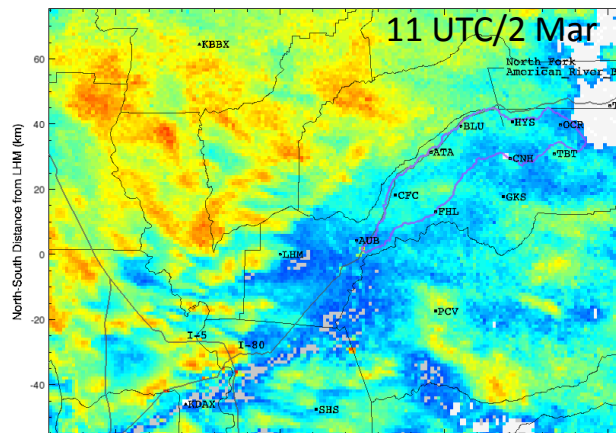
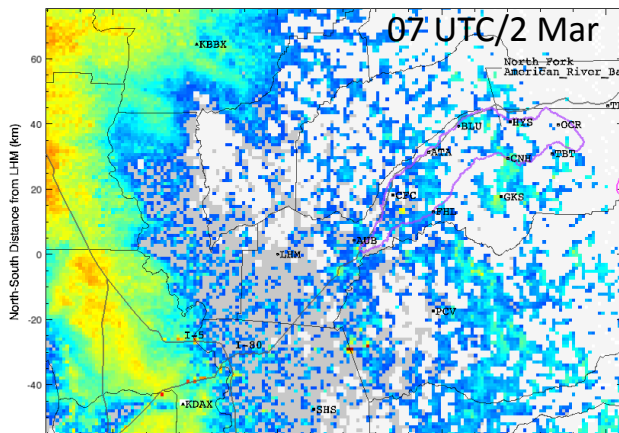
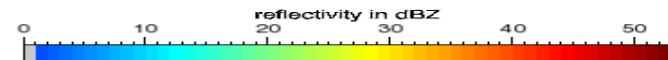
1 March



Sloughhouse, CA (SHS)  
38.50 N, 121.21 W, 50 m



# KDAX Radar Reflectivity Evolution



# Vertical Precipitation Structure @ Cazadero

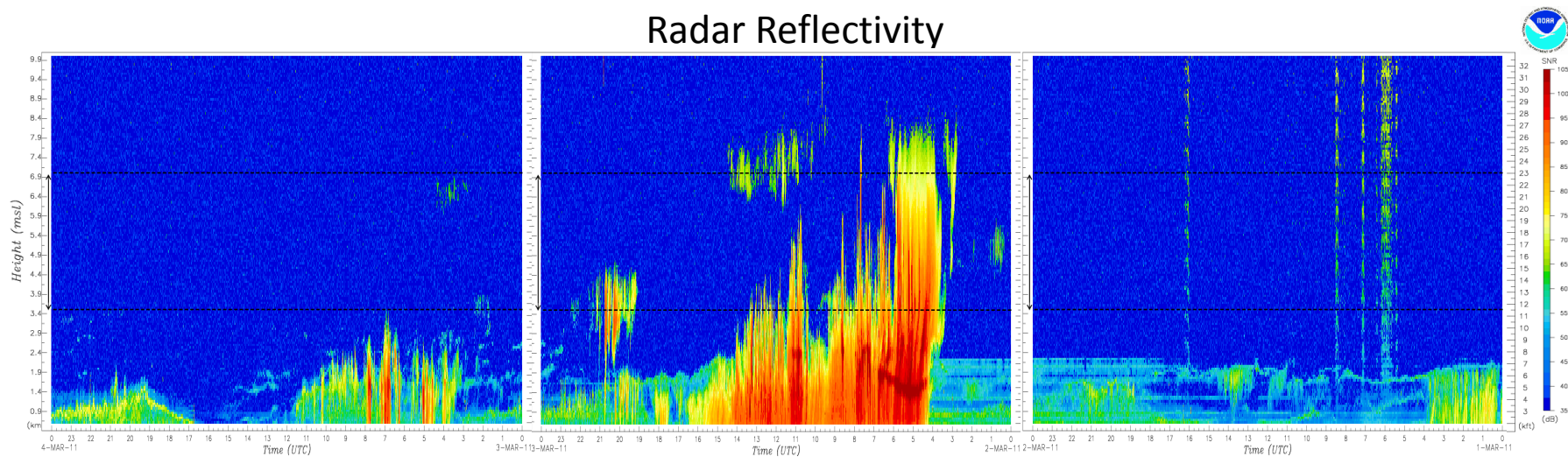
ESRL Physical Sciences Division  
Precipitation Profiling Radar

3 March

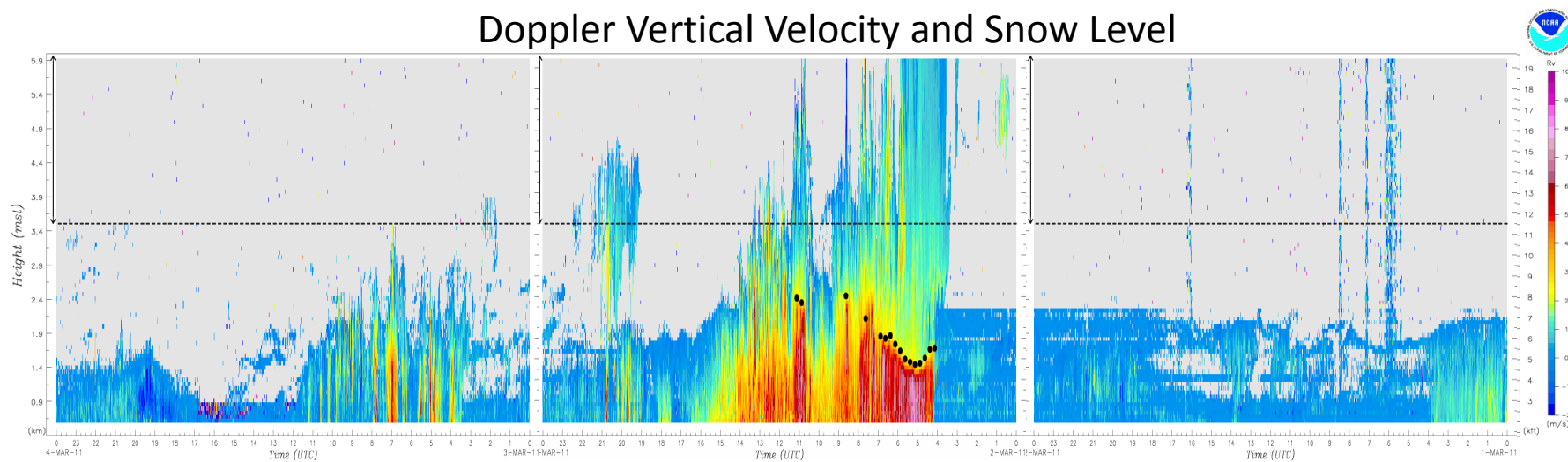
2 March

1 March

## Radar Reflectivity



## Doppler Vertical Velocity and Snow Level



Cazadero, CA (CZC)  
38.61 N, 123.22 W, 475 m

--- KMUX NEXRAD 0.5 degree beam  
● Snow Level



# Vertical Precipitation Structure @ Sugar Pine

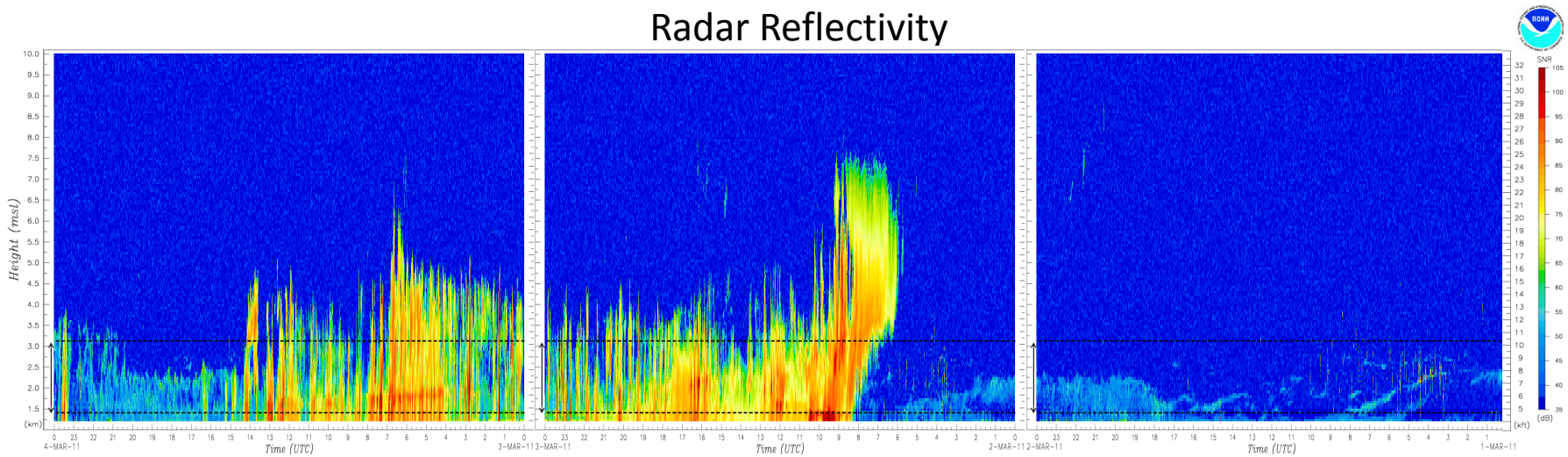
ESRL Physical Sciences Division  
Precipitation Profiling Radar

3 March

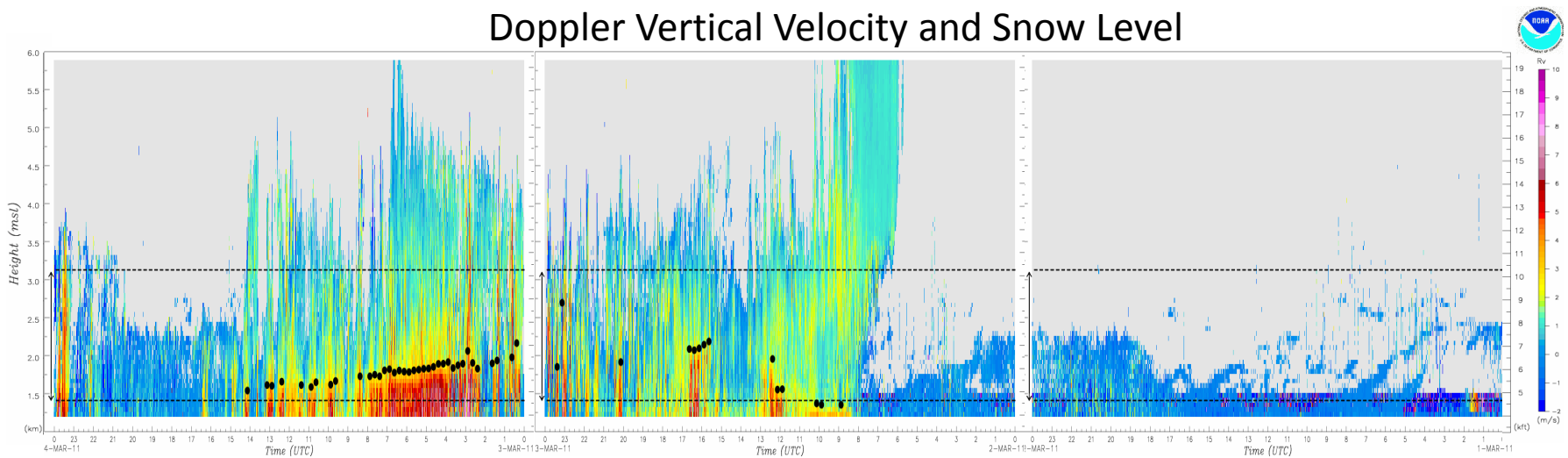
2 March

1 March

## Radar Reflectivity



## Doppler Vertical Velocity and Snow Level



Sugar Pine, CA (SPD)  
39.13 N, 120.80 W, 1066 m

--- KDAX NEXRAD 0.9 degree beam  
● Snow Level



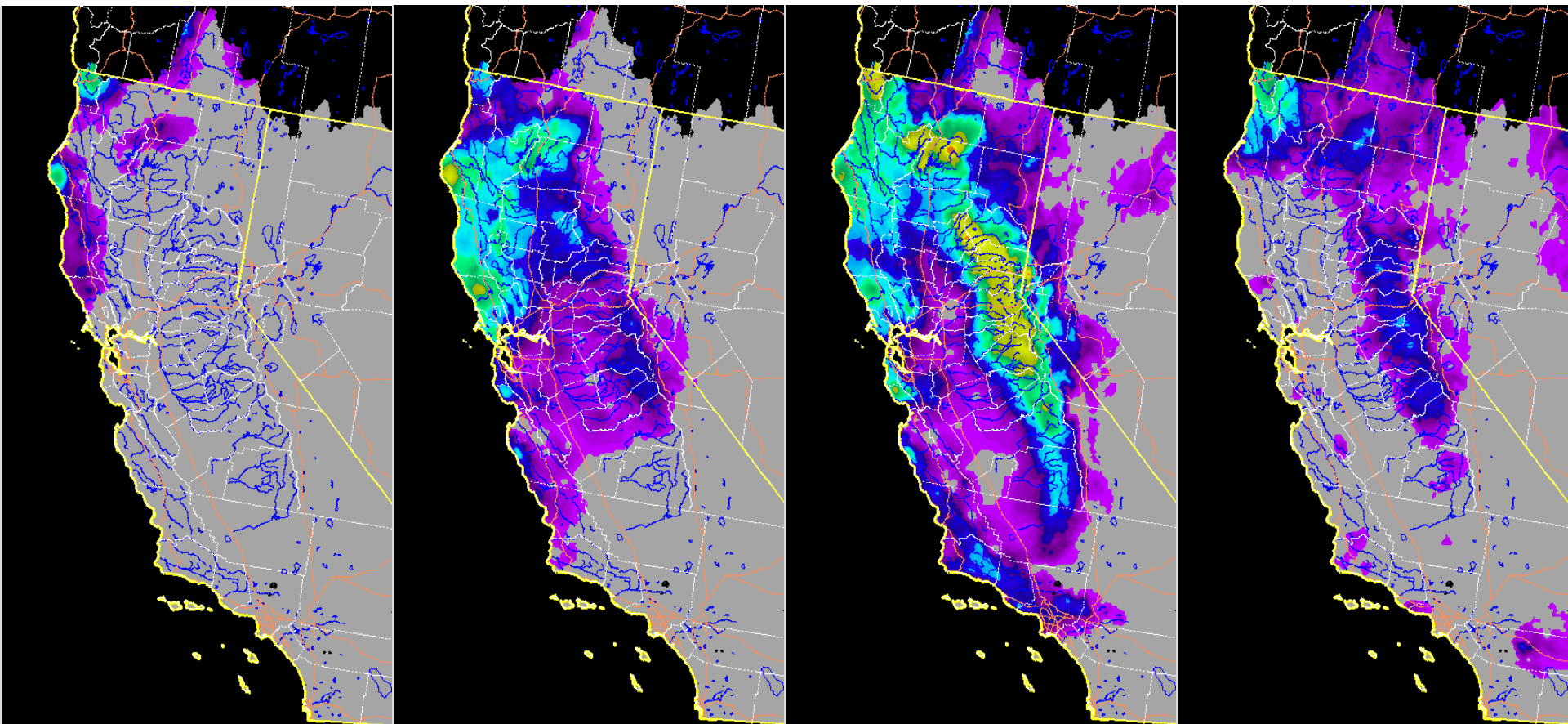
# CNRFC Precipitation Gauge + Mtn. Mapper QPE

24 h ending  
12 UTC 1 March

24 h ending  
12 UTC 2 March

24 h ending  
12 UTC 3 March

24 h ending  
12 UTC 4 March



# HMT + CDEC Precipitation Gauge Totals (06 UTC 1 March 2011 to 00 UTC 4 March 2011)

